

# PATENT ABSTRACTS OF JAPAN

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## **(54) INFORMATION RECORDING MEDIA AND PRODUCTION METHOD THEREOF**

(57)Abstract:

PROBLEM TO BE SOLVED: To provide either an information recording media such as a card or the like which has high heat resistance, and allows an embossing process and a discarding and incinerating treatment with ease, or the production method thereof, or both of them.

SOLUTION: The information recording media is obtained by laminating sequentially a front surface base material 1, an inner surface base material 2, a center core 6, an inner base material 3, and a front surface base material 4 formed of at least a thermoplastic polymer resin, wherein the thermoplastic polymer resin to serve as the front surface base material 1 and the front surface base material 4 is a non-crystalline thermoplastic polymer resin, the thermoplastic polymer resin to serve as the inner base material 2 and the inner base material 3 is formed of a crystalline polyethylene terephthalate polymer resin treated with a biaxially oriented process.

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## CLAIMS

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[Claim(s)]

[Claim 1] The thermoplastic macromolecule resin which the thermoplastic macromolecule resin which consists of thermoplastic macromolecule resin at least, and which is the information record medium which comes to carry out the laminating of the surface base material 1, the inner surface base material 2, a pin-center, large core, the inner surface base material 3, and the surface base material 4 one by one, and serves as the surface base material 1 and the surface base material 4 is amorphous thermoplasticity macromolecule resin, and serves as an inner surface base material 2 and an inner surface base material 3 is the information record medium characterized by to consist of crystalline polyethylene-terephthalate macromolecule resin to which biaxial-stretching processing was performed.

[Claim 2] The information record medium according to claim 1 which the direction of polymer orientation within the field of the inner surface base material 2 and the direction of polymer orientation within the field of the inner surface base material 3 become respectively symmetrical with a mirror image, and is characterized by having a mirror image relation at each other.

[Claim 3] The information record medium according to claim 1 or 2 characterized by forming in between the glue line of the surface base material 1, the inner surface base material 2 and the inner surface base material 3, and the surface base material 4 whose thickness is 1 micrometer - 10 micrometers, respectively.

[Claim 4] So that the orientation of the macromolecule of the inner surface base material 2 and the inner surface base material 3 may become symmetrical with a mirror image at each other It is the approach of arranging the polymer orientation of the inner surface base material 2 and the inner surface base material 3, and manufacturing the information record medium of a publication in claim 1 thru/or any 1 term of 3. The biaxial-stretching polyethylene terephthalate film of constant width used for the inner surface base material 2 and the inner surface base material 3 is cut out by predetermined die length. the cut-out film sheet -- the base material of the inner surface base material 2 and the inner surface base material 3 -- carrying out -- each of the inner surface base material 2 and the inner surface base material 3 -- so that it may be in agreement in the cutting approach of a sheet, and a longitudinal direction The manufacture approach of the information record medium which carries out a laminating together with a pin center, large core, the surface base material 1, and the surface base material 4, and is characterized by unifying.

[Claim 5] The manufacture approach of an information record medium given in claim 1 which carries out a laminating, and is characterized by using heating application of pressure in order to unify thru/or any 1 term of 4.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Field of the Invention] This invention is used for an ATM card, a credit card, an ID card (identification card), a membership card, a prepaid card, etc., has high thermal resistance and relates to the information record medium in which embossing printing is possible, and its manufacture approach.

#### [Description of the Prior Art]

[0002] From the former, information record media, such as an ATM card, and a credit card, an ID card, are used widely, the polyvinyl chloride (PVC) and the vinyl chloride vinyl acetate copolymer are mainly used as the raw material, and especially a polyvinyl chloride is common. Polyvinyl chloride resin is excellent in a physical mechanical characteristic, the embossing fitness of the alphabetic character section, etc., and since the cost of a raw material is cheap, it is widely used as a raw material of information record media, such as a card.

[0003] By the way, when thermal resistance is low and a storage temperature becomes 80 degrees C or more, a record medium may deform polyvinyl chloride resin or vinyl chloride vinyl acetate copolymer resin. Moreover, especially, in case polyvinyl chloride resin is discarded after an activity, although generate the hydrogen chloride gas at the time of incineration, an incinerator is damaged, and the life be shrunken enough and it is based on incineration temperature, it is said that there is also a possibility of producing dioxin.

[0004] As alternative resin of polyvinyl chloride resin, there is thermoplastics which does not contain halogens, such as polyethylene resin, polypropylene resin, polyester resin, polycarbonate resin, and Pori acrylic resin. However, since the physical properties of these resin differ from polyvinyl chloride resin considerably, in order to use it as a raw material of information record media, such as a card, it is necessary to perform new resin refining etc.

[0005] Then, since amorphous polyester resin PETG (the trade name of the polyester resin by the Eastman chemical company, ethylene glycol, a terephthalic acid, and dehydration condensation resin of cyclohexane dimethanol) has had a polyvinyl chloride and near physical properties in the past several years, it came to be observed and used. Moreover, in order to meet the want of high heatproof temperature, the alloy resin of PETG and poly KABONETO is developed and it is used as an object for cards. However, the heat-resistant temperature of PETG resin is low, and the alloy resin of PETG and poly KABONETO cannot respond to embossing of an alphabetic character, and it has the problem which produces big curl by embossing. Therefore, it is not the perfect raw material with which all can respond to a specification [ various kinds / as a raw material of information record media, such as a card, ].

#### [0006]

[Problem(s) to be Solved by the Invention] Let it be a technical problem to offer both an information record medium, and its manufacture both [ either or ], such as a card which

this invention was made paying attention to the above troubles, and has high thermal resistance, and embossing is possible, and is easy to carry out abolition incineration processing.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned technical problem in this invention, first in invention of claim 1 The surface base material 1 which consists of thermoplastic macromolecule resin at least, the inner surface base material 2, a pin center,large core, It is the information record medium which comes to carry out the laminating of the inner surface base material 3 and the surface base material 4 one by one. The thermoplastic macromolecule resin used as the surface base material 1 and the surface base material 4 is amorphous body thermoplasticity macromolecule resin. Let the thermoplastic giant-molecule resin used as the inner surface base material 2 and the inner surface base material 3 be the information record medium characterized by consisting of crystalline polyethylene terephthalate giant-molecule resin to which biaxial-stretching processing was performed.

[0008] Moreover, in invention of claim 2, the direction of polymer orientation within the field of the inner surface base material 2 and the direction of polymer orientation within the field of the inner surface base material 3 become respectively symmetrical with a mirror image, and it considers as the information record medium according to claim 1 characterized by having a mirror image relation at each other.

[0009] Moreover, in invention of claim 3, it considers as the information record medium according to claim 1 or 2 characterized by forming in between the glue line of the surface base material 1, the inner surface base material 2 and the inner surface base material 3, and the surface base material 4 whose thickness is 1 micrometer - 10 micrometers, respectively.

[0010] Moreover, so that the orientation of the macromolecule of the inner surface base material 2 and the inner surface base material 3 may become symmetrical with a mirror image in invention of claim 4 at each other It is the approach of arranging the polymer orientation of the inner surface base material 2 and the inner surface base material 3, and manufacturing the information record medium of a publication in claim 1 thru/or any 1 term of 3. The biaxial-stretching polyethylene terephthalate film of constant width used for the inner surface base material 2 and the inner surface base material 3 is cut out by predetermined die length. the cut-out film sheet -- the base material of the inner surface base material 2 and the inner surface base material 3 -- carrying out -- each of the inner surface base material 2 and the inner surface base material 3 -- so that it may be in agreement in the cutting approach of a sheet, and a longitudinal direction A laminating is carried out together with a pin center,large core, the surface base material 1, and the surface base material 4, and it considers as the manufacture approach of the information record medium characterized by unifying.

[0011] Moreover, in invention of claim 5, a laminating is carried out, and in order to unify, it considers as the manufacture approach of an information record medium given in claim 1 characterized by using heating application of pressure thru/or any 1 term of 4.

[0012]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained to a detail with reference to a drawing. Drawing 1 and drawing 2 are drawings showing the configuration of the information record media 10 and 20 concerning the

example and the example of a comparison of this invention, respectively.

[0013] The laminating of the surface base material 1, the printing layer 7, the inner surface base material 2, the pin center, large core 6, the inner surface base material 3, the printing layer 7, and the surface base material 4 is carried out one by one, and the information record medium 10 of this invention is constituted, as shown in drawing 1.

[0014] Next, each configuration is explained. In this invention, high thermal resistance and high endurance are given to an information record medium using the polyethylene terephthalate (PET) film to which biaxial-stretching processing of a lengthwise direction and a longitudinal direction was performed at the internal base material 2 and the internal base material 3 by making the PET film rival on the front face of the upper and lower sides of the pin center, large core 6. If the PET film of biaxial stretching is heated more than  $T_g$  (glass transition temperature) at the time of card processing and a card activity, it will produce deformation different, respectively in a lengthwise direction and a longitudinal direction by the stacking tendency of a macromolecule. In this case, if the orientation of a macromolecule has not gathered in each of the internal base material 2 and the internal base material 3, a layered product will produce deformation of the twist, curvature, etc. So, in this invention, the deformation problem of an information record medium is prevented by arranging the lengthwise direction (the direction of MD) of the macromolecule of the internal base material 2 and the internal base material 3, and lateral (the direction of TD) orientation, respectively.

[0015] It can control that the layered product by which a lamination laminating is carried out to the front face of the vertical both sides of the pin center, large core 6 in a PET film has the property of high thermal resistance and high endurance, and curl of an information record medium produces it in the case of embossing printing of an alphabetic character. However, by the impact in the case of embossing printing, it is easy to generate a crack on the front face of the PET film of the place in which the alphabetic character was formed, and a front face may keep a crack. So, in this invention, the crack initiation of a PET film is prevented by making the front face of a PET film rival and carrying out the laminating of the surface base material 1 and the surface base material 4 which consist of amorphous thermoplasticity macromolecule resin further to it.

[0016] The amorphous thermoplasticity macromolecule resin with which the surface base materials 1 and 4 have reinforcement For example, a polyvinyl chloride, polyvinyl acetate, PORIBU nil alcohol, A polyvinyl butyral, a polyvinylidene chloride, a polyvinyl acetal, An AS resin, a polycarbonate, a polymethyl methacrylate, polystyrene, ABS plastics, polysulfone, celluloid, polyphenylene oxide, for example, an amorphous elastomer, amorphous polyester, and PETG resin (the trade name of the polyester resin by the Eastman chemical company --) The modified resin of the synthetic resins of ethylene glycol, a terephthalic acid, and the dehydration condensation resin of cyclohexane dimethanol, natural resin, or those resin etc. can be used for independent or the combined complex, an alloy object, a blend object, etc. It is more desirable to use resin with a high elongation percentage, in order to prevent the base material surface check by embossing printing. Furthermore, it is also possible to add additives, such as an organic pigment, an inorganic pigment or organic dye, inorganic dye, a stabilizer, and a surface active agent, to those resin, and to reform resin.

[0017] Similarly the pin center, large core 6 consists of amorphous thermoplasticity macromolecule resin. For example, a polyvinyl chloride, polyvinyl acetate, PORIBU nil

alcohol, A polyvinyl butyral, a polyvinylidene chloride, a polyvinyl acetal, An AS resin, a polycarbonate, a polymethyl methacrylate, polystyrene, ABS plastics, polysulfone, celluloid, polyphenylene oxide, for example, an amorphous elastomer, amorphous polyester, and PETG resin (the trade name of the polyester resin by the Eastman chemical company --) The modified resin of the synthetic resins of ethylene glycol, a terephthalic acid, and the dehydration condensation resin of cyclohexane dimethanol, natural resin, or those resin etc. can be used for independent or the combined complex, an alloy object, a blend object, etc. It is more desirable to use resin with a high elongation percentage, in order to prevent the base material surface check by embossing printing. Furthermore, additives, such as an organic pigment, an inorganic pigment or organic dye, inorganic dye, a stabilizer, and a surface active agent, can be added to those resin, and resin can also be reformed. Moreover, it is also possible to embed a non-contact IC in rate with an antenna beforehand into the pin center, large core 6 if needed. For example, IC in rate is laid underground into the pin center, large core 6 by making the pin center, large core 6 two-layer, arranging a non-contact IC in rate with an antenna between two-layer, and performing a heat lamination.

[0018] And in order to prevent interlaminar peeling of each class, a glue line is formed between each of the surface base material 1, the inner surface base material 2 and the inner surface base material 2, the pin center, large core 6 and the pin center, large core 6, the inner surface base material 3 and the inner surface base material 3, and the surface base material 4. As a glue line, thermoplastic adhesives generally used, such as vinyl acetate adhesives, polyvinyl alcohol adhesives, polyamide adhesives, acrylic adhesives, polyester adhesives, polyurethane adhesive, an epoxy adhesive, and polyolefine adhesives, or heat-curing mold adhesives is used. If the thickness of a glue line becomes thin, bond strength will become weak and it will become easy to produce interlaminar peeling between a surface base material and an inner surface base material or between an inner surface base material and a pin center, large core. On the other hand, when a glue line becomes thick, the heat clip nature of a glue line may worsen, or the effect on an information record-medium front face may come out. Therefore, it is important to regulate the thickness of a glue line to 1.0 micrometers - 10 micrometers. What is necessary is just to use well-known approaches, such as the method of application by the coating approach by the printing approach by a screen printer etc., gravure coater, etc., a conventional roll coater, a conventional knife coating machine, etc., as the formation approach of a glue line.

[0019] Furthermore, the printing layers 7, such as ID information and a pattern design, are formed in the whole surface of the outside of the surface base materials 1 and 4, or some front faces. In order to raise the adhesive property of a surface base material and a printing layer, easily-adhesive processing, for example, corona discharge treatment, plasma treatment, resin spreading, etc. may be performed to the front face of a surface base material. Furthermore, other functional thin film layers, for example, a protective layer, a magnetic-recording layer, a visible recording layer, etc. may be prepared in the front face of a surface base material, or the front face of a printing layer in the whole surface or a part.

[0020] Furthermore, using a base material transparent to the surface base material 1 and the surface base material 4, between the surface base material 1 and the inner surface base material 2, functionality, such as a printing layer, can be established between the

surface base material 4 and the inner surface base material 3, and various functions nature can also be given to a card.

[0021] What is necessary is just to use the heat lamination approach using usual heating and application of pressure as an approach of carrying out the laminating of those surface base materials, an inner surface base material, and the pin center,large core, and unifying. The 1-time method which pressurizes by carrying out the laminating of the surface base material 1, the inner surface base material 2, the pin center,large core 6, the inner surface base material 3, and the surface base material 4 one by one, and heating them as a heat lamination method, The laminating of the inner surface base material 2, the pin center,large core 6, and the inner surface base material 3 is carried out one by one, the first heating and application of pressure are performed, and the unification with a pin center,large core and each inner surface base material is performed first. First, subsequently The laminating of the surface base materials 1 and 4 is carried out to the front face in the direction of the inner surface base materials 3 and 4 of this layered product, respectively, and the two-times method which performs the second heating and application of pressure is shown in it. Especially in the case of a two-times method, effect of the printing layer on lowering, a surface base material, and an inner surface base material can be made into the minimum for the temperature of the second heating and application of pressure.

[0022]

[Example] Hereafter, the concrete example of this invention is given and explained further.

[0023] <Example 1> Drawing 1 is the block diagram showing the configuration of the information record record medium 10 concerning the 1st example of this invention.

[0024] PETG whose 400-micrometer BIKATTO softening temperature in thickness is 100 degrees C The white sheet (size of 300x200mm) of the alloy resin of (the polyester resin obtained by the ethylene glycol by Eastman Chemical and the dehydration condensation reaction with cyclohexane dimethanol) and PC (poly KABONETO resin) is used as a pin center,large core 6. From the lengthwise direction (the rolling-up direction), the white polyethylene terephthalate film roll of biaxial stretching with 100 micrometers [ in thickness ] and a width of face of 300mm was cut out in die length of 200mm, and was used as the inner surface base materials 2 and 3.

[0025] Next, polyurethane adhesive was used for the front face of the vertical both sides of the pin center,large core 6, and the glue line with a thickness of 2 micrometers was formed by the roll coater, respectively. And orientation was arranged and the laminating was carried out to the vertical both-sides front face of the pin center,large core 6 so that the direction of polymer orientation within a field might become symmetrical with a mirror image to a pin center,large core, respectively about the inner surface base material 2 and the inner surface base material 3 which consist of a biaxial-stretching PET film.

[0026] Thus, the layered product by which the laminating was carried out is set to a heat press machine, and they are the temperature of 140 degrees C, and pressure abbreviation 1200kPa. On conditions, the heat press was performed and it unified. The obtained thickness formed the printing layers 7, such as a pattern alphabetic character, in the both sides of the layered product which is 0.6mm by screen-stencil. Furthermore, polyurethane adhesive was applied, respectively and the glue line was formed so that thickness might become 2 micrometers on the both-sides front face of this layered product.

[0027] And lamination, the temperature of 125 degrees C, and the conditions of about 1000 kPa(s) performed the heat press for the PETG film sheet transparent the thickness of 100 micrometers, and the size of 300x200mm on such a both-sides front face of a layered product as surface base materials 1 and 2. This cut out the obtained layered product in the configuration of an information record medium, and it considered as the information record medium 10 of this invention.

[0028] <Example 1 of a comparison> Drawing 2 is the block diagram showing the configuration of the information record medium 20 concerning the example 1 of a comparison of this invention.

[0029] Using the white sheet (size of 300x200mm) of the alloy resin of PETG (polyester resin obtained by the ethylene glycol by Eastman Chemical, and the dehydration condensation reaction with cyclohexane dimethanol) and PC (the poly KABONETO resin) which are 100 degrees C as a pin center, large core 6, from the lengthwise direction (the rolling-up direction), 600-micrometer BIKATTO softening temperature in thickness cut out the biaxial-stretching white polyethylene terephthalate film roll with 100 micrometers [ in thickness ], and a width of face of 300mm in die length of 200mm, and used it as the inner surface base materials 2 and 3

[0030] As well as the example 1, polyurethane adhesive was used for the front face of the vertical both sides of the pin center, large core 6, and the glue line with a thickness of 2 micrometers was formed by the roll coater, respectively. And orientation was arranged and the laminating was carried out to the vertical both-sides front face of a pin center, large core so that the direction of polymer orientation within a field might become symmetrical with a mirror image to the pin center, large core 6, respectively about the inner surface base material 2 and the inner surface base material 3 which consist of a biaxial-stretching PET film. Furthermore, this layered product was set to the heat press machine, and the heat press was performed on condition that the temperature of 140 degrees C, and pressure abbreviation 1200kPa, and it unified. By screen-stencil, the obtained thickness formed the printing layers 7, such as a pattern alphabetic character, in the front face of the layered product which is 0.8mm. Thus, the obtained layered product was cut out in the configuration of an information record medium, and it considered as the information record medium 20 of the example 1 of a comparison.

[0031] When the above performed the heat-resistant test in the 100-degree C environment using the information record medium 10 of an example 1 and the information record medium 20 of the example 1 of a comparison which were obtained, there is no deformation by both heat and good thermal resistance was shown. Furthermore, when the curl which printed alphabetic character embossing on the front face with the information record media 10 and 20, and was produced in the information record medium by printing was measured, the embossing curl both produced was 2.5mm or less. However, there is no crack in the embossed character front face of the information record medium 10, and the crack arose by the crack of PET on the embossed character front face of the information record medium 20.

[0032]

[Effect of the Invention] An information record medium, such as a card which it has high thermal resistance by carrying out the laminating of the lamination and surface base material which consist of amorphous thermoplastics further for the polyethylene terephthalate (PET) to which biaxial-stretching processing was performed at the both

sides of the pin center, large core which consists of thermoplastic giant-molecule resin according to [ as stated above ] this invention, respectively, respectively, and carrying out heating application of pressure, are the possibility of alphabetic character embossing printing and low embossing curl, and is moreover easy to carry out abolition incineration processing, can be manufactured.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the structure of the information record medium concerning the example 1 of this invention.

[Drawing 2] It is drawing showing the configuration of the information record medium concerning the example 1 of a comparison of this invention.

[Description of Notations]

1 -- Surface base material

2 -- Inner surface base material

3 -- Inner surface base material

4 -- Surface base material

5 -- Glue line

6 -- Pin center, large core

7 -- Printing layer

10 -- Information record medium

20 -- Information record medium

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